

## CLAIMS

- 1        1. A system for attenuation of acoustic waves traveling through a longitudinal  
2 member capable of transmitting said acoustic waves therethrough comprising:  
3              a plurality of spaced-apart masses firmly attached to an adjacent outer wall of said  
4 longitudinal member, each said plurality of masses having a predetermined  
5 spacing and a predetermined magnitude for attenuation of acoustic pulses in a  
6 predetermined frequency range.
  
- 1        2. The system for attenuation of acoustic waves according to claim 1 wherein said  
2 predetermined frequency range comprises 10 khz to 20 khz.
  
- 1        3. The system for attenuation of acoustic waves according to claim 2 wherein said  
2 plurality of masses comprises a material selected from (i) steel rings, and, (ii) tungsten  
3 rings.
  
- 1        4. The system for attenuation of acoustic waves according to claim 3 wherein said  
2 plurality of masses is between six and ten.
  
- 1        5. The system according to claim 1 wherein said spacing of the masses is within the  
2 range of twelve to fourteen centimeters.
  
- 1        6. The system according to claim 1 wherein the masses comprise metal rings

2 attached to the outer wall of the longitudinal member by neck pieces extending inward  
3 from an inner circumference of the rings.

1 7. The system according to claim 1 wherein each of said plurality of masses is  
2 attached to the longitudinal member by at least one neck piece.

1 8. The system according to claim 1 wherein the masses comprise metal rings  
2 attached to a shoulder on the longitudinal member.

1 9. The system according to claim 8 wherein the metal rings are asymmetrically  
2 attached to the shoulder on the longitudinal member.

1 10. An apparatus for performing acoustic investigations of a subsurface geological  
2 formation penetrated by a borehole comprising:

- 3 (a) a longitudinally extending body conveyed in said borehole;
- 4 (b) an acoustic transmitter supported by the body, said transmitter generating  
5 acoustic signals in the body, the borehole and the subsurface formations;
- 6 (c) an acoustic receiver spaced apart from the transmitter and supported by  
7 the body for receiving said acoustic signals; and
- 8 (d) an attenuator located on a substantially cylindrical portion of the body  
9 having an inner diameter and an outer diameter, between said acoustic  
10 transmitter and said acoustic receiver for attenuating said acoustic signals  
11 in the body within a predetermined frequency range;

12 wherein said attenuator comprises a plurality of spaced-apart masses having a  
13 predetermined spacing, mass and length firmly attached to an outer wall of the  
14 cylindrical portion of the body.

1 11. The apparatus of claim 10 wherein the longitudinally extending body is conveyed  
2 on a drilling tubular having a drillbit therein for drilling the borehole, said drilling tubular  
3 selected from the group consisting of (i) a drillstring, and, (ii) coiled tubing.

1 12. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced  
2 apart masses wherein said predetermined frequency range comprises 10 khz to 20 khz.

1 13. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced  
2 apart masses wherein material of said masses is selected from the group consisting of (i)  
3 steel rings, and, (ii) tungsten rings.

1 14. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced  
2 apart masses wherein said plurality of masses is between six and ten.

1 15. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced  
2 apart masses and wherein said spacing of the masses is within the range of twelve to  
3 fourteen centimeters.

1 16. A method of performing acoustic investigations of a subsurface geological

2 formation penetrated by a borehole comprising:

- 3           (a) conveying a logging tool having a substantially cylindrical body
- 4           into the borehole;
- 5           (b) activating a transmitter on the body for generating acoustic signals
- 6           in the formation, borehole and the body;
- 7           (c) attenuating signals passing through the body using an attenuator
- 8           comprising a plurality of spaced-apart masses firmly attached on an
- 9           outside adjacent wall of the body, said masses being spaced apart a
- 10          preselected distance to attenuate signals within a specified frequency
- 11          range;
- 12          (d) using a receiver on a side of the attenuator opposite the transmitter
- 13          for receiving signals through the formation and the attenuated signals
- 14          through the body.

1       17. The method of claim 16 wherein said specified frequency range comprises 10 khz  
2       to 20 khz.

1       18. The method of claim 16 wherein said plurality of masses comprises a material  
2       selected from (i) steel rings, and, (ii) tungsten rings.

1       19. The method of claim 16 further comprising conveying the logging tool on a  
2       drilling tubular.

1       20.     The method of claim 16 further comprising performing said acoustic  
2       investigations during drilling of the wellbore.

1       21.     A system for attenuation of acoustic waves traveling through a longitudinal  
2       member capable of transmitting said acoustic waves therethrough, comprising a plurality  
3       of spaced-apart masses firmly and asymmetrically attached to an adjacent outer wall of  
4       said longitudinal member, each said plurality of masses having a predetermined spacing  
5       and a predetermined magnitude for attenuation of acoustic pulses in a predetermined  
6       frequency range.

1       22.     The system according to claim 21 wherein the plurality of masses comprises a  
2       material selected from (i) steel rings, and (ii) tungsten rings.

1       23.     The system according to claim 21 wherein the predetermined frequency range  
2       comprises 10khz to 20 khz.

1       24.     The system for attenuation of acoustic waves according to claim 21 wherein said  
2       plurality of masses is between six and ten.

1       25.     The system according to claim 21 wherein said spacing of the masses is within the  
2       range of twelve to fourteen centimeters.

1       26.     A method of performing acoustic investigations of a subsurface geological

2 formation penetrated by a borehole comprising:

- 3           (a) conveying a logging tool having a substantially cylindrical body
- 4           into the borehole;
- 5           (b) activating a transmitter on the body for generating acoustic signals
- 6           in the formation, borehole and the body;
- 7           (c) preferentially attenuating signals passing through the body in a
- 8           predetermined direction using an attenuator comprising a plurality of
- 9           spaced-apart masses firmly and asymmetrically attached on an outside
- 10          adjacent wall of the body, said masses being spaced apart a preselected
- 11          distance to attenuate signals within a specified frequency range;
- 12          (d) using a receiver on a side of the attenuator opposite the transmitter
- 13          for receiving signals through the formation and the attenuated signals
- 14          through the body.

1       27. The method of claim 26 wherein said specified frequency range comprises 10 khz  
2       to 20 khz.

1       28. The method of claim 26 wherein said plurality of masses comprises a material  
2       selected from (i) steel rings, and, (ii) tungsten rings.

1       29. The method of claim 26 further comprising conveying the logging tool on a  
2       drilling tubular.

1       30.   The method of claim 26 further comprising performing said acoustic  
2       investigations during drilling of the wellbore.